DECLYC

The results of the studies carried out as part of the Low-Carbon Industrial Zones (ZIBaC) program reflect above all the collective vision of the involved industrial stakeholders. These pathways provide a structuring contribution to the development of national decarbonisation strategies, but do not constitute an established or official vision of those strategies.

The DECLYC project aims to define decarbonisation strategies to reduce CO_2 emissions and the environmental footprint of the Chemistry Valley and neighbouring areas, to establish governance models for potential shared solutions that may emerge, and thereby to maintain the competitiveness and long-term sustainability of industrial and R&D centers.

Work Package 2
Biogas

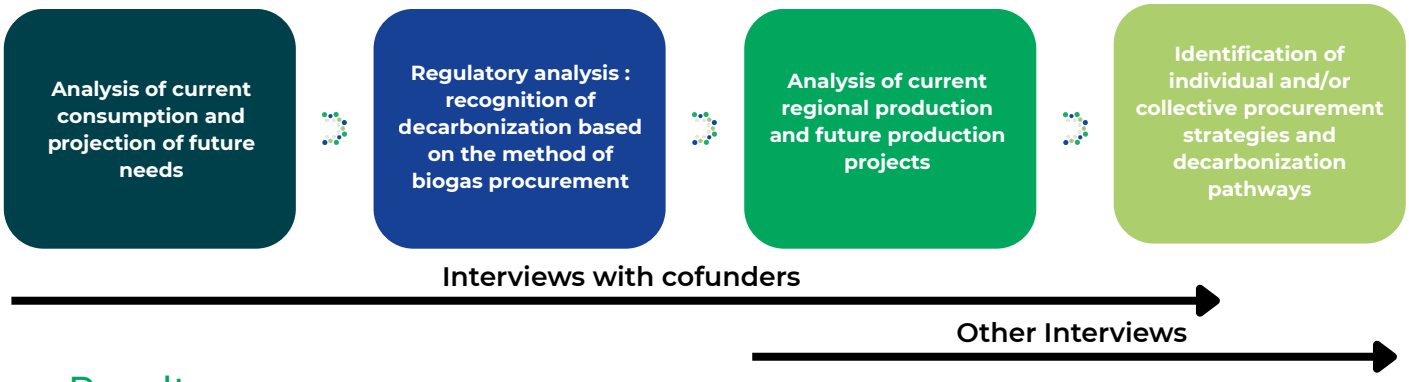
Context and Objectives

This study aims to assess the potential for decarbonizing the gas sector for the co-funding industrial partners, from technical, regulatory, and economic perspectives. The objective is to propose several decarbonization pathways for natural gas that take into account the energy needs identified by the industrial partners, possible contractual options, and the decarbonization potential of the various options, in order to establish economic and greenhouse gas emission trajectories based on these scenarios.

Methodology

Based on an analysis of current gas consumption for energy needs and processes of the studied industrial plants, as well as projections of decarbonization projects for these sites (biomass, electrification), several scenarios were developed. These scenarios combine projections of gas consumption with decarbonization alternatives for this consumption, involving the substitution of natural gas with biogas, biomethane, or low-carbon gas.

In-depth interviews were conducted with the relevant industrial companies, as well as a series of supplementary interviews with third-party stakeholders in the local or national ecosystem (producers, aggregators, suppliers, etc.).



Results

Across the four prospective scenarios co-developed with the industrial stakeholders, consolidated gas demand varies between 50 and 500 GWh/year by 2050. The observed increases in consumption are linked either to growing industrial activity or to a rise in the amount of steam sold to external clients outside the scope of the study. Decreases in consumption stem from projects aiming to substitute gas with another energy carrier or from energy-efficiency improvements.

In all cases, the use of this energy carrier remains primarily dedicated to steam production, and to a lesser extent to process and thermal uses, and marginally to tertiary needs on industrial sites. Consequently, decarbonizing the gas vector represents a major challenge for the Vallée de la Chimie.

The analysis of greenhouse gas accounting frameworks (EU-ETS, GHG Protocol, SBTi, etc.) highlighted significant regulatory complexity regarding the recognition of decarbonization associated with the use of biogas or biomethane.

Several options and purchasing modalities for biomethane were assessed in order to decarbonize a gas demand that could represent up to 9% of regional biomethane production by 2050.

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Based on a set of criteria, it appears feasible to decarbonize the long-term residual consumption through a combination of long-term purchase contracts such as Biomethane Purchase Agreements (BPAs)—relevant when a sufficient consumption baseline is maintained in the medium and high scenarios—and occasional purchases of green gas (GoOs + PoS) across all scenarios.

Moreover, the use of biomethane offers flexibility, gradual implementation, and decision-making levers for industrial players in their decarbonization pathways—advantages that alternative solutions do not provide. This underscores the complementary nature of this option.

Biogas therefore emerges as a relevant solution to activate, alongside other measures, to ensure the full decarbonization of industrial sites. Co-investment in a production unit would additionally allow stakeholders to integrate the value chain and secure their own energy supply.

Minimum consumption scenario		Intermediate consumption scenario		Maximum consumption scenario	
Green gas purchase (GoOs)	✓	Green gas purchase (GoOs)	✓	Green gas purchase (GoOs)	✓
BPA	✗	BPA	✓	BPA	✓
BPA + co-investment	✗	BPA + co-investment	✗	BPA + co-investment	✓

Perspectives

The study identified promising opportunities for renewable gas production in the Vallée de la Chimie, including the presence of potential feedstock sources (from waste generation), but also highlighted a major challenge regarding the availability of suitable land for development.

Moreover, steam production is a central issue, since most of the gas consumed will continue to be dedicated to this use—partly for the actors' own needs and partly for contracted supply. It is therefore essential to address the collective dimension for stakeholders bound by steam purchase agreements.

- Any decarbonization of gas supply would generate additional costs that would need to be passed on to steam supply contracts.
- Conversely, it will not be possible to fully decarbonize gas use without considering a deep decarbonization of steam production.

Finally, the co-funders—particularly those linked by steam purchase contracts—could benefit from the development of a joint purchasing structure, such as a joint venture or an economic interest group (GIE), to procure all or part of the biogas collectively. This alternative would represent a significant shift in the gas procurement model for industrial players, but would enable the negotiation of more competitive prices for large volumes.

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